SUBCHRONIC TOXICITIES OF INDUSTRIAL AND AGRICULTURAL CHEMICALS TO FATHEAD MINNOWS (PIMEPHALES PROMELAS)

VOLUME I

by

Center for Lake Superior Environmental Studies

Lake Superior Research Institute

University of Wisconsin-Superior

D.J. Call and D.L. Geiger

Contributing Biologists and Chemists

Cheryl Anderson
Larry Brooke
Daniel Call
Carolanne Curtis
Dianne Geiger
Dean Hammermeister
Sandra Harting
Alex Hoffman
Marilynn Hoglund
James Huot
Michael Knuth
Ann Lima
Carol Lindberg
Dennis McCauley
Thomas Markee
Catherine Moriarity
Carol Northcott
Steven Poirier
Patricia Schmieder
Pamela Shubat
Daniel Symonik
Jeffrey Yurk

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Tetrahydrofuran

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Test Dates: 07/14/82 to 08/16/82
Exposure Duration: 33 Days
Test Species: Fathead Minnow

Source: Aldrich Chemical Company
Purity/Grade: 99.5+%
CAS Number: 109-99-9
Molecular Formula: C4H8O
Molecular Weight: 72.11

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EXPERIMENT SUMMARY

An early life-stage test was conducted with the fathead minnow and the chemical, tetrahydrofuran. Fathead minnow embryos that were ≤ 24 hr old were obtained from the Environmental Research Laboratory-Duluth (U.S.EPA) main and annex culture units, and all embryo masses were pooled. Fifty embryos were randomly selected and transferred to each of 24 egg cups. Two egg cups were placed in each exposure chamber (100 embryos/chamber). At hatch, 15 fry from each egg cup and its replicate were randomly selected and transferred to the exposure chamber (30 fry/chamber). The exposure was performed with a Mount-Brungs flow-through diluter. Some chemical contamination occurred in control chamber 1A, which presumably was due to volatility. Measured concentrations were lower than nominal concentrations due to volatility. The log P of this chemical is 0.46. A 96-hr acute toxicity test was conducted, yielding an LC50 of 2160 (1970-2360) mg/l. These data, along with the early life-stage toxicity test results, have been published in Call et al. (1985), and the published analyses may vary slightly from analyses contained herein due to the employment of different statistical procedures.

The Wet Weight and Length data were analyzed using a William's Test ($P<0.05$). Percent Normal Larvae at Hatch and Percent Survival data were transformed using the Freeman-Tukey Arc Sine method prior to analysis by William's Test.

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TEST CONDITIONS
(MEAN, N, STD. DEVIATION)

Temperature (C): (25.73, 120, 0.89) Tank Volume (L): 4.9
Dissolved Oxygen (MG/L): (6.55, 28, 0.80) Additions (V/D): 6.56
pH : (7.76, 24, 0.14) Dilution Factor: 0.6
Hardness (MG/L CaCO3): (44.70, 5, 1.10)
Alkalinity (MG/L CaCO3): (43.90, 5, 2.01)
Acidity (MG/L CaCO3): (not recorded)
Specific Conductivity (umhos/cm): (not recorded)

Tetrahydrofuran

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TOXICANT EXPOSURES
UNITS: mg/l

Method of Chemical Analysis: Gas-Liquid Chromatography
Stock Solution Preparation: Direct Removal from Commercial Bottle Containing the Chemical
Detection Limit: 13.0 mg/l

TANK	NOMINAL CONC.	MEAN UNCORRECTED CONC.	NO. OF SAMPLES	STD. ERROR OF THE MEAN	CORRECTED+ AVERAGE
1A	0.000	8.650	10	1.466	8.349
1B	0.000	<13.0 mg/l	10		
2A	310.000	122.017	12	6.017	117.777
2B	310.000	125.800	10	6.373	121.429
3A	516.000	218.542	12	9.973	210.948
3B	516.000	230.800	10	12.165	222.780
4A	860.000	377.500	12	16.750	364.382
4B	860.000	384.300	10	20.333	370.946
5A	1430.000	736.000	12	34.382	710.425
5B	1430.000	751.250	10	38.034	725.145
6A	2390.000	1188.750	12	44.334	1147.442
6B	2390.000	1237.100	10	46.942	1194.112

Average Spike Recovery (%):103.60 n= 12 Std. Dev: 6.40
Duplicate Analysis Agreement(%): 98.3 n= 11 Std. Dev: 1.8

+ Values corrected by average percent spike recovery

TEST RESULTS

A: EMBRYO HATCH (4 - 5 DAYS OF INCUBATION)

TANK	INITIAL NO. OF EMBRYOS	NO. HATCHED EMBRYOS	NO. NORMAL LARVAE	NO. ABNORMAL LARVAE	%NORMAL LARVAE
1A	97	81	81	0	100
1B	100	85	85	0	100
2A	99	84	83	1	99
2B	96	81	80	1	99
3A	100	83	77	6	93
3B	101	84	84	0	100
4A	98	82	80	2	98
4B	98	89	85	4	96
5A	100	84	81	3	96
5B	100	88	88	0	100
6A	99	79	77	2	97
6B	101	80	78	2	98

Tetrahydrofuran

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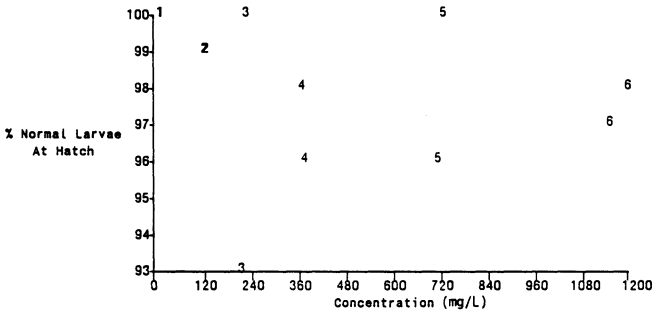
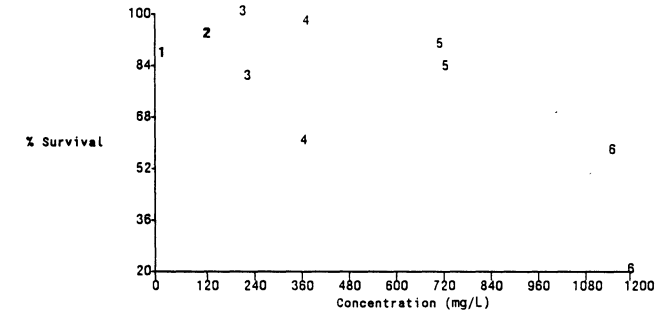
PLOT OF PERCENT NORMAL LARVAE AT HATCH VERSUS CONCENTRATION



B: JUVENILE SURVIVAL AT 33 Days

TANK	INITIAL NUMBER OF FRY	NUMBER DEAD	NUMBER ALIVE	PERCENT SURVIVAL
1A	30	4	26	87
1B	30	4	26	87
2A	30	2	28	93
2B	30	2	28	93
3A	30	0	30	100
3B	30	6	24	80
4A	30	12	18	60
4B	30	1	29	97
5A	30	3	27	90
5B	30	5	25	83
6A	30	13	17	57*
6B	30	24	6	20*

PLOT OF PERCENT SURVIVAL VERSUS CONCENTRATION



Tetrahydrofuran

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C: JUVENILE GROWTH AT 33 Days

TANK	NO. of FISH	MEANS AND STANDARD DEVIATIONS WET WEIGHT (mg)	DRY WEIGHT (mg)	LENGTH (mm)
1A	26	100 (33.5)	- (-)	18.6 (2.0)
1B	26	128 (40.5)	- (-)	19.7 (1.8)
2A	28	118 (38.5)	- (-)	19.5 (1.9)
2B	28	110 (38.0)	- (-)	18.7 (2.2)
3A	30	113 (32.7)	- (-)	18.9 (1.8)
3B	24	125 (40.7)	- (-)	19.5 (2.2)
4A	18	105 (33.0)	- (-)	18.7 (1.9)
4B	29	91.8 (29.4)	- (-)	17.2 (2.4)
5A	27	62.4* (27.3)	- (-)	15.3* (2.4)
5B	25	52.6* (26.1)	- (-)	14.5* (2.4)
6A	17	11.4* (7.2)	- (-)	9.2* (2.1)
6B	6	14.3* (5.6)	- (-)	10.0* (0.9)

Tetrahydrofuran

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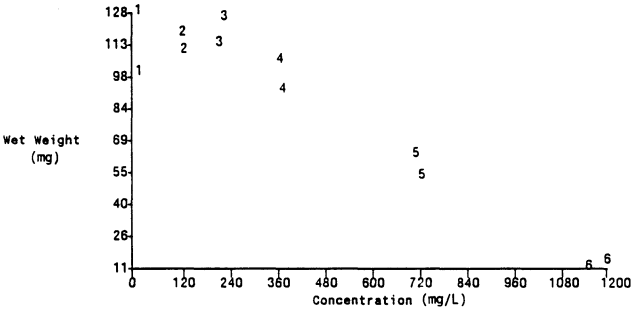
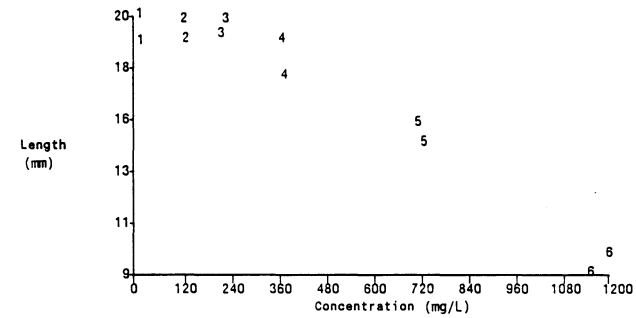
PLOT OF MEAN WET WEIGHT VERSUS CONCENTRATION



PLOT OF MEAN DRY WEIGHT VERSUS CONCENTRATION

[MEASUREMENTS NOT TAKEN]

PLOT OF MEAN LENGTH VERSUS CONCENTRATION



Tetrahydrofuran

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SUMMARY OF SIGNIFICANT RESULTS
UNITS: MG/L

	NOEC	LOEC	CHRONIC VALUE
PERCENT NORMAL AT HATCH	1170	*	>1170
PERCENT SURVIVAL	717	1170	~~960~~ 916
WET WEIGHT	367	717	513
DRY WEIGHT	-	-	-
LENGTH (standard)	367	717	513

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* = Not Determined
\- = Not Measured

Most Sensitive Endpoint(s):
Wet Weight and Length